IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Singer, et al.	Examiner:	Allen Wong
Application No.:	09/779,875	Group:	2613
Filed:	February 8, 2001	Atty.Docket No.	0162095-0022
Title:	"DYNAMIC SYSTEM CONTROL METHOD"		

PETITION TO MAKE SPECIAL

The applicants of the above-identified patent application hereby petition to make this application special pursuant to M.P.E.P. § 708.01, subsection VIII. Please charge the $130 fee set forth in 37 CFR 1.17(i) and any additional fees to our Deposit Account Number 03-1721. This application has not received any examination by the Examiner.

This Petition to Make Special is with respect to the following pending claims, all of which are directed to a single invention. If the Office determines that the presented claims are not all directed to a single invention, applicants will make an election without traverse as a prerequisite to the grant of special status. The presented claims are claims 1-102 of the divisional application that accompanies this petition to make special. These claims have been renumbered in the divisional application, but correspond to Claims 30-61, 91-126, 130-147, 170, 171, and 173-186 of Application Ser. No. 09/262,781 to which this petition and divisional application claim priority. (A petition was granted on September 15, 2000, "Making Special" Claims 148-151, 156, 159-161, 164, 167, and 187-192 of Application Ser. No. 09/262,781.)

The presented claims are directed to methods and apparatus for controlling movement in a dynamic system through various techniques not disclosed in the prior art. The techniques include various modeling steps and/or shaping steps, with a goal of

reducing unwanted mechanical and/or acoustic vibrations. In particular, independent claims 1 and 33 are directed to a method and apparatus for controlling movement of a dynamic system which can be expressed in terms of both rigid and flexible modes, including steps of generating and processing a rigid body input to produce a processed input which compensates for vibrations in the flexible mode of the system. Independent claims 23 and 55 are directed to a method and apparatus for determining a response of the dynamic system in terms of a modal analysis in a plural mode model of the system, and calculating approximations of values relating to plural switch times based on estimated values using an expression for the contribution of each of the plural modes to a final location of the system. Independent claims 31 and 62 are directed to a method and apparatus for determining whether a system input will excite a system to greater than a predetermined level of vibrations, and modifying an input that does so as to reduce the level of vibrations in the system to less than the predetermined level of vibrations. Independent claim 64 is directed to a method of generating a model defining system position in terms of both time and a system input and constraining the system in accordance with one or more constraints relating to unwanted vibrations. Independent claim 68 is directed to a method of shaping a current command using a unity magnitude shaper to drive a current controller into saturation, and supplying voltage as a physical limiting parameter to the system from the power supply via the current controller in saturation. Independent claims 69 and 77 are directed to a method and apparatus for controlling a dynamic system or data storage device system having one or more feed forward inputs, where one of the feed forward inputs corresponds to a fundamental limiting parameter of the system, by altering the feed forward input so as to reduce

unwanted dynamics of the system. Independent claim 84 is directed to a method of shaping an input comprising digital data sampled at a predetermined frequency, by identifying system vibrations corresponding to a sine wave having two sample points per period that occur at the Nyquist frequency for the system, and applying a three-pulse shaper to the input. Independent claim 85 is directed to a method of generating an input to a computer-controlled dynamic system, by determining the frequency of vibrations to be suppressed, and if the frequency is at or below a servo rate for the dynamic system, determining a servo output based on servo calculations and outputting the servo output as the input to the dynamic system, but if the frequency is above the servo rate for the dynamic system, shaping a trajectory and outputting the shaped trajectory as the input to the dynamic system. Independent claim 86 is directed to a method of generating an input by determining a servo output based on servo calculations, shaping a trajectory value for the feed forward input, and adding the servo output stored in memory to the shaped trajectory value so as to generate a feed forward input. Independent claim 87 is directed to a method of shaping an input command to saturation, inputting the saturated command until a first predetermined condition is detected, shaping a transition of the input command during deceleration from saturation until a second predetermined condition occurs, and following a preset trajectory until the dynamic system comes to within a predetermined proximity of its final state. Independent claims 89, 95 and 98 are directed to methods of generating commands for a dynamic system in a first parameter which maintain a limit in a second parameter, where the second parameter comprises a fundamental limiting parameter of the dynamic system, by determining a response of the second parameter in the dynamic system to a unit command in the first parameter, and

generating the command in the second parameter based on the response determined in the determining step. Independent claim 97 is directed to a method of identifying transitions of an input command to the dynamic system, and shaping transitions of the input command so as to result in a system response to the input command with reduced vibrations. Finally, independent claim 102 is directed to a method of linearly rescaling a vibration-limiting input to a dynamic system.

The applicants hereby state that a pre-examination search was made by a foreign patent office. In particular, the European Patent Office performed a search and a copy of the International Search Report accompanies this petition along with copies of the five references cited. It is submitted that this international search meets the requirement for a pre-examination search. These cited references will now be discussed.

European patent application No. 0 441 407 A1 teaches a system for positioning a transducer in which acceleration and deceleration profiles are established by minimizing the square of acceleration which serves as a cost function. Target position, target velocity and target acceleration are represented by polynomials which result from the acceleration and deceleration patterns which minimize the integral of the acceleration squared. Neither page 5 lines 16-56, pointed out by the European Examiner, nor any other portion of this reference teaches or suggests controlling movement of a dynamic system which can be expressed in terms of both rigid and flexible modes, determining plural switch times for a voltage input, employing a model which constrains the system with one or more constraints relating to the unwanted vibrations, altering feed forward inputs corresponding to fundamental limiting parameters of the system, or any of the other methods or apparatus set forth in the claims being presented herein for special status.

US patent No. 5,696,647 discloses various techniques for carrying out seeks in a disk drive to limit acoustic noise arising from changes in acceleration of the actuator. Acoustic noise is suppressed by limiting the acceleration of the actuator that supports the transducer, by limiting a control signal to be outputted to the actuator driver and having a component that is determined from the difference between a profile velocity and an estimate of the radial velocity of the transducer across the disc surface. This reference is strictly limited to design techniques for controlling acoustic noise in a disk drive. Neither column 6 line 59 through column 8 line 57, pointed out by the European Examiner, nor any other portion of this reference discloses the methods or apparatus set forth in the presented claims.

European patent application No. 0 543 654 A2 is directed to a positioning control system for a magnetic head which estimates an arrival time that the controlled device takes from a current position to a designated position and to set the estimated arrival time as a target moving time when the control device is positioned at the designated target position. The positioning control system enables the controlled device such as a magnetic head to be positioned stably and at high speed. This reference is devoid of any teaching or suggestion of the methods or apparatus as set forth in the claims being presented herein.

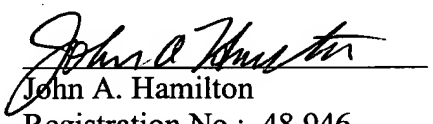
European application No. 0 308 062 is directed to a disk file digital control system that incorporates means for measuring the time between samples of read/write head position error signals and uses a value of that measured time as part of the computation of a digital control signal. The system results in improved performance in moving the head to a target track when there is variation in the nominal position error

signal sampling time caused by variations in the disk file drive motor speed. Again, there is no teaching whatsoever concerning the methods or apparatus set forth in the presented claims.

UK patent application No. GB 2303732A is directed to a head velocity/position estimator. An estimator estimates current head velocity and compares the estimated head velocity with a velocity command. Head movement is controlled based on the difference between the commanded velocity and the estimated head velocity. As with the other references discussed herein, this reference is entirely lacking any teaching of the methods or apparatus set forth in the claims being present for special status.

It is submitted that all of the elements set forth in M.P.E.P. §708.02 subsection VIII have now been provided in this petition to make special. It is requested that this petition be granted and that the presented claims be examined as soon as possible.

Respectfully submitted:



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